

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

Claims 1-58 (canceled).

59. (currently amended): An index structure for locating and extracting a fragment of metadata divided into fragments, the index structure contained in a computer readable storage medium and comprising:

a list of multi-keys which correspond to a combination of fields of the metadata; and
location information for defining a multi-key of the list and locating and extracting the fragment of metadata, wherein the multi-key is a plurality of keys used simultaneously to locate and extract the fragment of metadata, wherein with respect to comparison of values of a multi-key in size, the multi-key comprises fields (k1, k2, k3...kn) of the metadata which are prioritized (k1>k2>k3>...Kn), and the combined fields are compared in sequence, starting from a first field having a highest order of priority, wherein the values are compared on an arithmetic basis where the values of the multi-key are numerical or ranked in lexicographical order where the values of the multi-key are alphabetical.

60. (previously presented): The index structure as claimed in claim 59, further comprising values of the multi-key and identification information of the metadata corresponding to the values of the multi-key.

61. (previously presented): The index structure as claimed in claim 60, wherein the identification information of the metadata comprises identification information on ones of the fragments of the metadata corresponding to the values of the multi-key.

62. (previously presented): The index structure as claimed in claim 59, wherein the location information is expressed in a language for addressing parts of a markup language document.

63. (previously presented): The index structure as claimed in claim 59, wherein at least a part of the location information is expressed as a predetermined code.

64. (previously presented): The index structure as claimed in claim 59, wherein the location information comprises location information of a fragment including the multi-key and location information of the multi-key included within the fragment.

65. (previously presented): The index structure as claimed in claim 59, wherein the metadata is metadata as defined in the TV-Anytime (“TVA”) Forum.

66. (previously presented): The index structure as claimed in claim 59, further comprising:

a sub-section including ranges of values of the multi-key and identification information on ones of the fragments of the metadata corresponding to the values of the multi-key; and

a section including representative key values representing the respective ranges of values of the multi-key.

67. (previously presented): The index structure as claimed in claim 66, wherein each of the representative key values is a value among the corresponding range of values of the multi-key.

68. (previously presented): The index structure as claimed in claim 66, wherein:

the list includes identification information on the section; and

the section further includes identification information on the sub-section.

69. (currently amended): An index structure suitable for locating and extracting metadata divided into fragments, the index structure contained in a computer readable storage medium and comprising:

values of multi-keys; and

identification information of the metadata corresponding to the values of the multi-keys, wherein the multi-keys correspond to a combination of fields of the metadata used simultaneously to locate and extract a fragment of metadata, wherein with respect to comparison of the values of a multi-key in size, the multi-key comprises fields (k1, k2, k3...kn) of the metadata which are prioritized (k1>k2>k3>...Kn), and the combined fields are compared in sequence, starting from a first field having a highest order of priority, wherein the values are compared on an arithmetic basis where the values of the multi-key are numerical or ranked in lexicographical order where the values of the multi-key are alphabetical.

70. (previously presented): The index structure as claimed in claim 69, further comprising a list of the multi-keys.

71. (previously presented): The index structure as claimed in claim 70, further comprising location information for defining the multi-keys, wherein at least a part of the location information is expressed as a predetermined code.

72. (previously presented): The index structure as claimed in claim 69, wherein the identification information of the metadata comprises identification information of ones of the fragments of the metadata corresponding to the values of the multi-keys.

73. (previously presented): The index structure as claimed in claim 69, wherein for a multi-key of the multi-keys, the index structure further comprises a representative value representing a predetermined range of the values of the multi-key.

74. (previously presented): The index structure as claimed in claim 69, wherein for a multi-key of the multi-keys, the index structure further comprises:

a sub-section comprising ranges of values of the multi-key and identification information on ones of the fragments of the metadata corresponding to the values of the multi-key; and

a section comprising representative key values representing the respective ranges of values of the multi-key.

75. (canceled).

76. (currently amended): The index structure as claimed in claim ~~75~~69, wherein first and second values of the multi-key corresponds to (a1, a2, a3...an) and (b1, b2, b3...bn), respectively, and the first and second values (a1, a2, a3...an) and (b1, b2, b3...bn) of the multi-key are determined to be of the same size where there is no field having a different size.

77. (currently amended): An index structure for metadata divided into fragments, the index structure contained in a computer readable storage medium and comprising:

a key index list section comprising a list of multi-keys, each multi-key corresponding to a combination of fields of the metadata used simultaneously to locate and extract a fragment of metadata;

a key index section; and

a sub-key index section, wherein for a multi-key of the key index list:

the sub-key index section comprises ranges of values of the multi-key and identification information on ones of the fragments of the metadata corresponding to the values of the multi-key, and

the key index section comprises representative key values representing the respective ranges of values of the multi-key, wherein with respect to comparison of the values of a multi-key in size, the multi-key comprises fields (k1, k2, k3...kn) of the metadata which are prioritized (k1>k2>k3>...Kn), and the combined fields are compared in sequence, starting from a first field having a highest order of priority, wherein the values are compared on an arithmetic basis where the values of the multi-key are numerical or ranked in lexicographical order where the values of the multi-key are alphabetical.

78. (previously presented): The multi-key index structure as claimed in claim 77, wherein the key index list section further comprises location information for defining the multi-keys, wherein at least a part of the location information is expressed as a predetermined code.

79. (currently amended): A computer readable storage medium containing a data structure for storing an index for a fragment of metadata divided into fragments, the index provided to search the metadata, the data structure comprising:

a list of multi-keys which correspond to a combination of fields of the metadata; and

location information for defining a multi-key of the list and locating and extracting the fragment of metadata, wherein the multi-key is a plurality of keys used simultaneously to locate and extract the fragment of metadata, wherein with respect to comparison of values of a multi-key in size, the multi-key comprises fields (k1, k2, k3...kn) of the metadata which are prioritized (k1>k2>k3>...Kn), and the combined fields are compared in sequence, starting from a first field having a highest order of priority, wherein the values are compared on an arithmetic basis where the values of the multi-key are numerical or ranked in lexicographical order where the values of the multi-key are alphabetical.

80. (currently amended): A computer readable storage medium containing a data structure for storing an index for metadata divided into fragments, the index provided to search the metadata, the data structure comprising:

values of multi-keys; and

identification information of the metadata corresponding to the values of the multi-keys, wherein the multi-keys correspond to a combination of fields of the metadata used simultaneously to locate and extract a fragment of metadata, wherein with respect to comparison of the values of a multi-key in size, the multi-key comprises fields (k1, k2, k3...kn) of the metadata which are prioritized (k1>k2>k3>...Kn), and the combined fields are compared in

sequence, starting from a first field having a highest order of priority, wherein the values are compared on an arithmetic basis where the values of the multi-key are numerical or ranked in lexicographical order where the values of the multi-key are alphabetical.

81. (currently amended): A computer readable storage medium containing a data structure for storing an index for metadata divided into fragments, the index provided to search the metadata, the data structure comprising:

a key index list section comprising a list of multi-keys, each multi-key corresponding to a combination of fields of the metadata used simultaneously to locate and extract a fragment of metadata;

a key index section; and

a sub-key index section, wherein for a multi-key of the key index list:

the sub-key index section comprises ranges of values of the multi-key and identification information on ones of the fragments of the metadata corresponding to the values of the multi-key, and

the key index section comprises representative key values representing the respective ranges of values of the multi-key, wherein with respect to comparison of the values of a multi-key in size, the multi-key comprises fields (k1, k2, k3...kn) of the metadata which are prioritized (k1>k2>k3>...Kn), and the combined fields are compared in sequence, starting from a first field having a highest order of priority, wherein the values are compared on an arithmetic basis where the values of the multi-key are numerical or ranked in lexicographical order where the values of the multi-key are alphabetical.

82. (previously presented): The index structure as claimed in claim 59, wherein the multi-key is comprised of a plurality of attributes of the fragment of metadata.

83. (previously presented): The index structure as claimed in claim 69, wherein the multi-key is comprised of a plurality of attributes of the fragment of metadata.

84. (previously presented): The index structure as claimed in claim 77, wherein the multi-key is comprised of a plurality of attributes of the fragment of metadata.

85. (currently amended): A computer readable storage medium containing an index structure for locating and extracting a fragment of metadata, wherein the metadata is divided into fragments, the index structure comprising:

a list of keys, the list identifying a key containing information for a plurality of attributes of the fragment of metadata to be located, wherein the information for each of the plurality of attributes of the key are used simultaneously to locate and extract a fragment of metadata;

location information corresponding to the key and specifying a location of the fragment of metadata, wherein with respect to comparison of the values of a key in size, the key comprises fields (k₁, k₂, k₃...k_n) of the metadata which are prioritized (k₁>k₂>k₃>...K_n), and the combined fields are compared in sequence, starting from a first field having a highest order of priority, wherein the values are compared on an arithmetic basis where the values of the key are numerical or ranked in lexicographical order where the values of the key are alphabetical.

86. (currently amended): A computer readable storage medium containing an index structure for locating and extracting a fragment of metadata, wherein the metadata is divided into fragments, the index structure comprising:

a list of keys, the list identifying a key containing information for a plurality of elements of the fragment of metadata to be located, wherein the information for each of the plurality of elements of the key are used simultaneously to locate and extract a fragment of metadata;

location information corresponding to the key and specifying a location of the fragment of metadata, wherein with respect to comparison of the values of a key in size, the key comprises fields (k1, k2, k3...kn) of the metadata which are prioritized (k1>k2>k3>...Kn), and the combined fields are compared in sequence, starting from a first field having a highest order of priority, wherein the values are compared on an arithmetic basis where the values of the key are numerical or ranked in lexicographical order where the values of the key are alphabetical.

87. (new): The index structure as claimed in claim 59, wherein for two multi-key values, (a1, a2, ..., an) and (b1, b2, ..., bn):

(a1, a2, ..., an) is larger than (b1, b2, ..., bn) if and only if there exists an integer i ($0 \leq i \leq n-1$) such that for every j ($0 \leq j \leq n-1$), $a_j = b_j$ and $a_i > b_i$;

(a1, a2, ..., an) is smaller than (b1, b2, ..., bn) if and only if there exists an integer i ($0 \leq i \leq n-1$) such that for every j ($0 \leq j \leq n-1$), $a_j = b_j$ and $a_i < b_i$; and

(a1, a2, ..., an) is equal to (b1, b2, ..., bn) if and only if for every i ($0 \leq i \leq n-1$), $a_i = b_i$.